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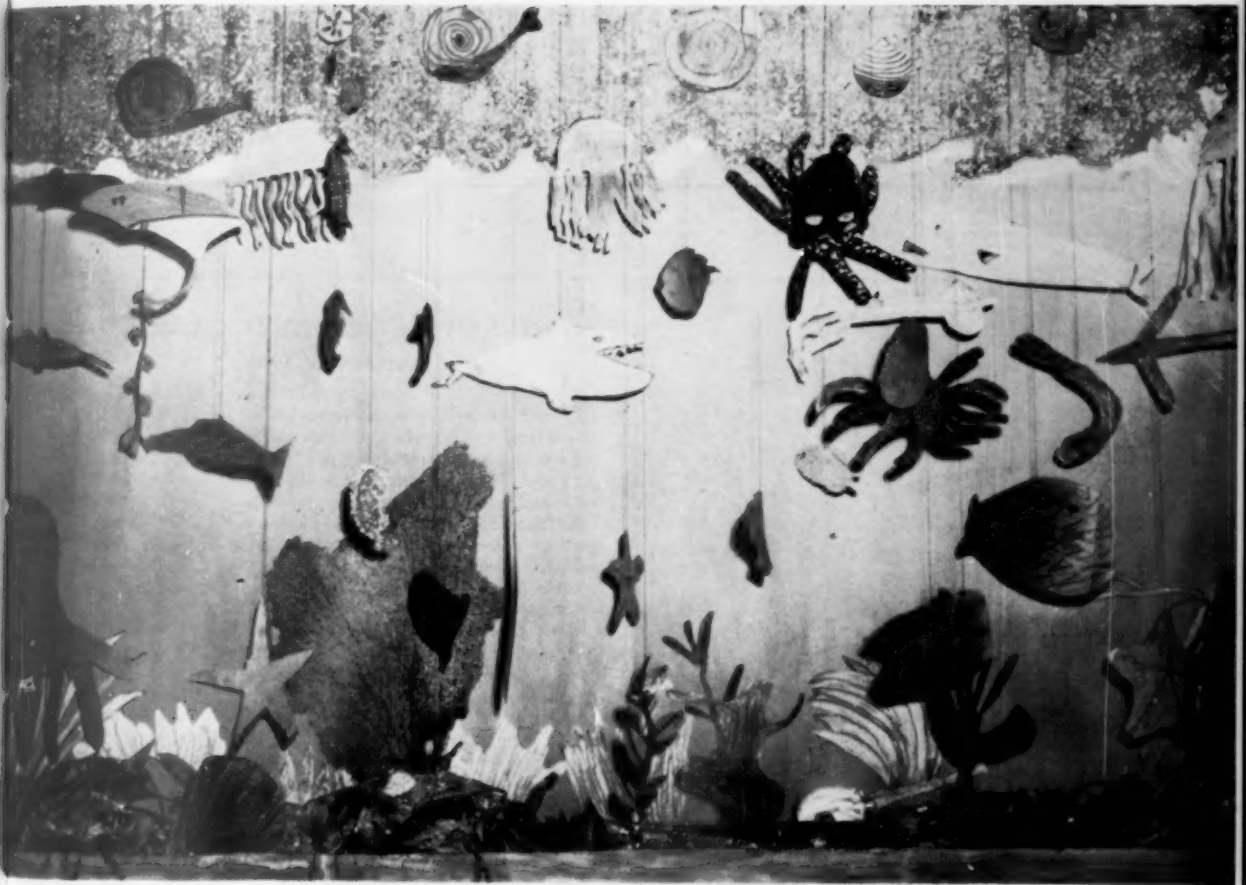
A PRACTICAL SERVICE AND IDEAS PUBLICATION FOR TEACHERS OF NATURE STUDY  
AND THE LIFE SCIENCES FROM THE ELEMENTARY GRADES THROUGH COLLEGE

*Official journal of*

The National Association of Biology Teachers

OCTOBER, 1953

VOL. 15, NO. 6



A Seashore Project Inshore • Knowledges of Botany Possessed by High School and  
College Students • An Easily Constructed Microprojector • Inspiration via the Disc •  
A Simple Indication of the Efficacy of a Teaching Device • Use of Balsa Wood in  
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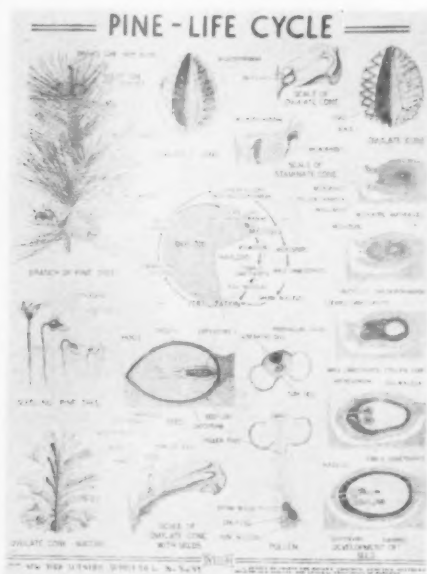
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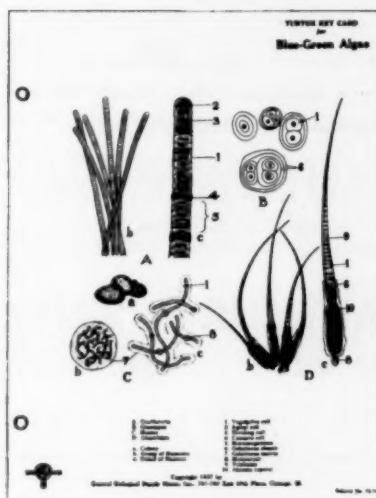
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## THE AMERICAN BIOLOGY TEACHER

Publication of the National Association of Biology Teachers.

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## The American Biology Teacher

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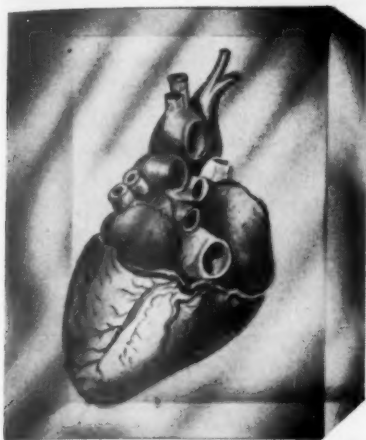
The contents of previous issues of *The American Biology Teacher* can be found by consulting the *Education Index* in your library.

### COVER PHOTO

The view shows an "aquarium" of sea animal figures built by third-grade pupils for their "Seashore Project Inshore" (see page 145), using a large mattress box. The background was painted blue-green; animals were freehand drawings, mounted on cardboard and painted or colored according to each child's interpretation. "Seaweeds" and "shells" cover the "ocean floor." The photo was taken by eighth-grader Fred Booher, using a 4×5 Speed Graphic camera with flash.

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## A Seashore Project Inshore

ERMA VANCE, Butler Township Elementary School, Vandalia, Ohio (photos by eighth-grader Fred Booher)

Assoc. Editor: This article shows vividly how a science project can tie in all subject matter areas in elementary teaching.

Christmas was over and we were back on regular school routine. I was searching for some project to stimulate my third grade class when one of our boys brought in a sand dollar, a starfish, and a sea urchin that he had collected along the coast of South Carolina. The children's intense curiosity about these prompted me to propose a study of sea animals during our project time the next day. Since our English period was rather lengthy, we often used part of it for a project period and, during previous projects, some more advanced children had been introduced to the use of dictionaries and encyclopedias.

The next morning two children came to school with copies of *National Geographic Magazine* containing illustrations of ocean life. We referred to our elementary science books and secured more advanced books. Even the more disinterested children were inspired to try to find some new facts from the dictionaries and encyclopedias.

Whenever possible the art teacher coordinated her work with our projects. I suggested that ocean life subject matter would be timely for a one-period lesson; I didn't expect this subject to hold the interest of third-grade children for long. From a high school

museum we secured many beautiful shells and skeletons, and a small octopus. The octopus was what really captured the children's enthusiasm. They could handle the animal and watch his tentacles move about a bit. News about the octopus soon spread throughout the school, and we had crowds around our door



FIG. 1. Individually made and illustrated "dictionaries," news items, songs, story magazines, and a class story book form an interesting display.

wanting to see it. Finally we decided to have our children take turns carrying "Octopus Willy" to other rooms so that everyone could see him.

More shells and skeletons were brought to school. One child shared a very informative book written in a way that children can

understand, *Seashells of the Florida Coast*, By Francis Wyly Hall. A senior girl's classified sea shell collection had won honors in a science exhibit. She showed her collection to our class. The youngsters liked the idea of mounting the shells, and this prompted three children in the class to mount their own and to learn the names of a few of them.

Our departmental music teacher came to the next music period with two songs about the sea: "Oceans Trails," and "Sea Horse." "Sea Horse" was so short that some of the children wanted to add another verse (Fig. 1). The composer's words, as printed in *New Music Horizons*, Silver Burdett Co., N. Y. are:

The sea horse said to the little fish, "Do you want to ride with me?  
I'll take you down to the ocean floor, at the bottom of the sea.  
I'll show you things that you never saw, a great big whale and a shark:  
And I'll take you back to your Mamma fish, again before it's dark."

This verse was added by two third-graders:

"If you take me to my home, Mother'll let me come again,  
And that will be much fun for me, At the bottom of the sea.  
Please take me to my Mamma fish, And she will say, 'All right.'  
She'll put me in my little bed, And then kiss me good-night."

Another class member shared his records, "Bozo Under the Sea." He played these over and over, and I don't believe the class would ever have tired of them.

Interest in sea life seemed to be mounting instead of decreasing. Our art instructor was due again. She asked if we would like mount animals made in the previous class in a shadow box. She located an enormous mattress carton. We cut out an entire side except for a four-inch border. The children all clamored for a chance to paint the ocean waves, and put in the sandy beach of glue sprinkled with sawdust. By the time we suspended the first cut-out animal figure, by heavy thread through the top of the huge box, our youngsters had advertised well our project. When a child had extra time from routine work he spent it on making more animals for the "aquarium." As time progressed, we filled the box with many wierd figures that would sway with each movement of air.

Someone suggested using Christmas tree lights inside the border of the box. This was unsuccessful as the small lights didn't give enough illumination. We tried outdoor Christmas tree lights, using mostly green and blue bulbs with some white ones for added light. This was very effective at night. In front, just inside the border, we stapled cellophane to give the effect of water. Every class member seemed truly proud of his part in the project, and appeared to feel that much had been accomplished (see cover page photo).



FIG. 2. Cut-out figure of each sea animal holds on display a child's original poem about that animal.

Our English course of study introduced story-writing. For one of our "story adventures," each child assumed the identity of some kind of ocean animal and wrote a story telling of an experience. The following was written by a third-grade girl:

#### Octopus Willy

I am Willy, the octopus. For a long time I was the only octopus in this ocean. All of the other animals made fun of me, and called me "Eight Arms." One day I saw something I had never seen before. It was shaped like a star. I asked this strange thing his name. He answered "Jupiter Starfish." Then Jupiter asked me why I always looked so sad. I told him how the other animals made fun of me. Jupiter told me not to be sad any more, and he gave me some ink. Now I protect myself by squirting ink between my enemies and me.

Each child contributed a story for our class story book. We circulated this through the other third grade rooms, and then kept the book on display. The cover was decorated appropriately (Fig. 1).

In the third grade English curriculum we study rhymes and try to compose original ones. Since our project furnished endless sub-

ject matter, this seemed a good time to introduce the unit. The following was written by one of our boys:

I'm a mighty sword-fish,  
In the bottom of the sea;  
I came upon a sunken ship,  
It might be a trap for me.  
  
I started to explore the wreck;  
I came upon a treasure chest.  
It was filled with gold and silver;  
The rubies and diamonds I liked best.

The poems were mounted on some of the animal figures made in art class (Fig. 2).

In searching for information, one of the children found an article in the daily newspaper in "Uncle Ray's Corner." Following this article was a series of stories about ocean animals. Soon we had children searching the papers each night, and practicing reading this adult material so that they might read it to the class. I'm sure any elementary teacher would welcome any incentive which would encourage a child to practice reading. In the information about the sawfish, dimensions were given for the body and the saw. The boys asked if it would be possible to make one this size.

They went to work at recess and noon, using the cardboard left from the mattress carton. "Mr. Saw" was cut out and painted brown. One of our young scientists made a correctly-sized eye, covered with cellophane. This was a scary-looking object hanging from the ceiling. It made an unique mounting for reports, also written in English class (Fig. 3).

Someone thought we really should thank Uncle Ray for helping us. This was a fine incentive for a letter, since we endeavor to teach correct letter form. Usually we choose our best two or three letters to send, but this

time each child tried so hard to write a letter that would rate a place in the mail that I finally gave up trying to choose, and sent each one of them. Uncle Ray not only sent a reply, but also sent five magazines with stories of the sea.

Earlier in the year we experimented with making slides for projection. We found we could work best on clear glass with colored ink. Some of the children wanted to make ocean-animal slides. They drew pictures on paper cut  $3\frac{1}{2}'' \times 4''$ , taped a drawing to the underneath side of the standard glass lantern slide, and transferred the picture to the glass with colored ink. Several more advanced pupils learned how to use the lantern slide projector, and were trusted to set it up and run it. This proved intensely interesting not only to our class but to almost every other class in the building. A child explained each picture as it appeared on the screen.

During the entire time we collected quite a museum through the efforts of the children, their parents and friends. When our project was about half finished, open-house night was planned. Because the youngsters were so proud of what they had done, they wanted to show it to everyone. The open-house offered an opportunity for the children to explain the project to visitors. They gave two complete demonstrations without any adult help.

We do not have science instruction in the third grade, as a formal subject, but I am sure that many of the children will remember the things learned through our project for a long time. I feel that, where formal classes are still used to teach basic subjects, some time spent on this sort of thing gives the advanced child a chance to use his superior mentality when basic work is completed. In this particular project we discovered that one boy with a high I.Q., who had not shown too much enthusiasm in routine class work, was intensely interested in science and was far beyond his years in knowledge of such things. He read every thing he could find about ocean animals. The open-house demonstrations gave him a chance to explain some things in a way that astonished all who heard. It gave others a chance to work with their hands in learning some of the mysteries of living things, and those who liked music participated in that way.

I believe this is a truly meaningful way to teach science in the lower grades, and it gives



FIG. 3. "Mr. Saw" displays children's reading research reports.

the learner a real reason for using what has been taught in formal subjects. Project material is unlimited. I would not have considered presenting "Seashore Animals Inshore" in the third grade. The children presented it themselves. Children, who are encouraged to bring interesting things to school to share with others, can furnish far more project material than ever can be used.

## The Use of Balsa Wood in the Preparation of Skins of Small Mammals

ALLEN H. BENTON, New York State College for Teachers, Albany, N. Y.

Many biology teachers in high schools and colleges maintain a small collection of mammal skins for teaching use. These collections are subject to much unskilled handling and as a result there is likely to be considerable damage to even the best-made specimens. Legs and tails are frequently lost, so that replacements are constantly needed. In the case of common species this is no more than a nuisance, but specimens which cannot be

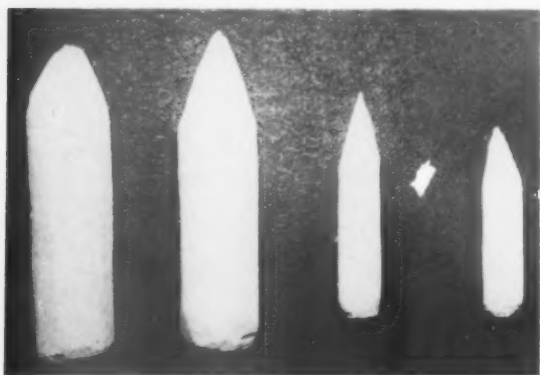


FIG. 1. Pre-shaped balsa wood body forms for small mammals. From left to right, *Pitomys pinetorum*, *Blarina brevicauda*, *Sorex fumeus*, *Sorex cinereus*.

readily replaced present a real problem. Often these specimens are not put out for class use, thus rendering them essentially valueless. The proper solution is to make specimens less destructible.

The use of pre-shaped balsa wood bodies offers much promise in this connection. These bodies (Fig. 1) can be whittled from one inch stock for animals from the size of a deer mouse to the size of a chipmunk, and

from  $\frac{1}{2}$  inch stock for smaller shrews and mice. The bodies are shaped roughly in advance with a scalpel or razor blade, and modified slightly to fit the individual when the specimen is prepared. The tail wire is firmly imbedded in the balsa body, and insect pins or steel wires are put through the legs and into the body. Small slots may be made in the body on the ventral surface to facilitate placement of the wires. Care should be taken that the body is not too large, so that it

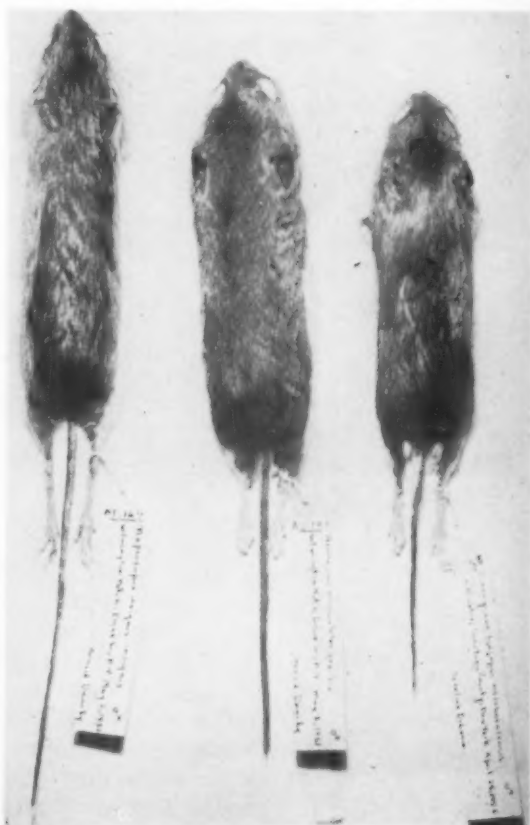


FIG. 2. Mammal skins prepared with pre-shaped balsa wood body forms. Left to right, *Neotoma insignis*, *Peromyscus maniculatus*, *Peromyscus maniculatus gracilis*.

stretches the skin, since this will change the arrangement of the hairs and result in change of color. Cotton pads may be placed under the eye openings, so that the specimens will be externally uniform with those stuffed with cotton.

Besides the increased durability thus achieved, there are several other advantages of the balsa wood method. Body shape can be more accurately approximated with balsa than with cotton. The balsa is much easier to insert and if prepared in advance will re-

sult in some saving of time in preparation. The biologist who makes few skins will make better skins by using this method (Fig. 2).

The balsa wood may be purchased from hobby stores at a cost of one to three cents per body form, depending upon the size of the specimen. It is probably not practical for animals larger than a chipmunk, but the problem of breakage is not so acute in these specimens. It is especially useful for the small shrews whose skins are often very delicate.

Balsa wood will probably never supplant cotton as a material for stuffing mammals. It is, however, a useful substitute when well-made and durable specimens are of primary importance.

### DR. JULIAN HUXLEY WINS KALINGE AWARD

Dr. Julian S. Huxley was awarded the Kalinge Prize for distinguished popular writing in science recently during a ceremony at Unesco House in Paris. This annual award was established in 1951 as a gift to Unesco from Mr. B. Patnaik, distinguished industrialist from India, and includes a cash grant this year of over \$2800. In establishing the prize, Mr. Patnaik said, "I am convinced of the necessity of making the great masses aware of the methods and achievements of scientific research, and to make them understand the impact of science on our daily behavior."



Dr. Huxley is the grandson of biologist Thomas Huxley, 19th century proponent of Darwin. He is the world-famous author of many popular life science books and articles, including *Essays of a Biologist* and *Man in the Modern World*, and is also well-known for his prize-winning film, "The Private Life of the Gannett," and his radio series on "Scientific Research and Social Needs." Dr. Huxley left in September for Australia, will spend a week on The Great Barrier Reef, attend the Pacific Science Congress at Manila, and then travel to Java and Thailand. After attending the Indian Science Congress, he will spend several months in India.

### Food-Chain Culture of *Daphnia*

E. F. BARROWS and ERIC SCHWAB,

Oregon College of Education, Monmouth, Oregon

There is a need for easier methods of keeping alive more kinds of laboratory animals. The usual published methods are too exacting to be followed by most of us. The animals may each be used for only a week or two during the year as laboratory specimens in a course, but we realize the educational value of having them continually available to the students. The amount of work involved in maintaining such cultures by the usual procedures, suited to research, is generally prohibitive.

For example, previous methods of culturing *Cladocera* generally require either careful preparation of food, or rather frequent transfer to fresh cultures, or both, and almost daily observations to see that all is well. Artificial aeration is also recommended in some cases. When so much care is required, these animals, excellent for instruction purposes, are omitted for most courses, or inferior preserved specimens are used.

This paper tells of an attempt to provide a new method for maintaining *Daphnia* with the least possible labor.

We have kept *Daphnia* in gallon pickle-jars and two-gallon rectangular aquariums. Each was supplied with aged tapwater, a small *Elodea* plant left floating, and a few *Planoribus* snails, the so-called Japanese ramshorns of tropical fish fanciers. The only materials added were small amounts of fish food one to three times a week, but not regularly, and more aged tap-water every two to

three weeks to offset evaporation. The fish food was the fine size of Reliance Tropical Fish Food from the Reliance Products Company, Montclair, New Jersey. Stirring the water briefly with a finger caused about a third of the food to settle. If any of the food remained on the surface the following day, it was skimmed off, and the ration reduced.

Temperatures much above 70° F. proved harmful; 55° to 60° F. were very satisfactory. After the snails had occupied a jar about two weeks, long enough to have produced a slight accumulation of excreta, the *Daphnia* were introduced. The food-chain was then: fish-food—snails—bacteria, living on snail excreta—*Daphnia*.

The *Daphnia* environment was thus fairly natural and uniform, and almost self maintaining. Only small numbers of young were produced. For this reason, there was seldom any need of transferring to a new jar, certainly not more often than three times a year. Labor saving methods of maintaining other laboratory animals should be useful to instructors in zoology.

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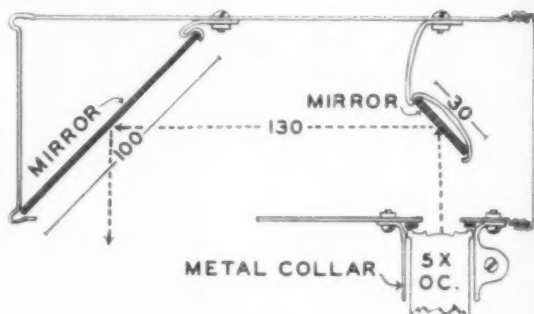
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## An Easily Constructed Microprojector for Drawing Purposes

LEONARD REID DAVIS and GEORGE W. BOWMAN, Regional Animal Disease Research Laboratory, Bureau of Animal Industry, U. S. Dept. of Agriculture, Auburn, Alabama

It is easier for the average person to make exact scale drawings by tracing a projected image than to use a camera lucida, an instrument particularly inconvenient for left-handed people. A 45° angle microprojection prism on a horizontal microscope will permit vertical projection onto drawing paper, but specimens temporarily mounted in fluids cannot be so projected.

The simple microprojector described here was designed for use on a vertical microscope. Direct planimeter measurements of small objects, such as nematode larvae, can be made without making dimension marks which have to be measured later. The device uses the periscopic principle to reflect the image horizontally and then downward onto the top of the table, by means of two war surplus front-silvered mirrors which cost less than \$1.00. When using a 5× ocular, the microprojector will give magnifications of approximately 100×, 200×, and 430×, with 10×, 20×, and 44× objectives, respectively. Raising the draw tube or changing the projection distance will vary the image size. By rotating the draw tube, the instrument can be turned to permit drawings to be made by right- or left-handed persons. For small group demonstrations, the screw cap of the mailing tube mirror housing can be removed and the smaller mirror turned around to project the image horizontally onto a large ground glass or small motion picture



A simple microprojector made from two front-silvered mirrors and a metal mailing tube can be used for drawing or measuring at table level.

screen. This makes a satisfactory substitute for a more expensive microprojection prism.

The diagram shows approximate dimensions in millimeters. When using the indicated mirror sizes and a 5× ocular, the entire visual field of the microscope will be projected. A 10× ocular can be used for greater magnification, but the outer portion of the field will be lost unless the larger mirror measures at least 80 × 140 mm. Bent strips of metal are used to support the mirrors at a 45° angle over two holes at the ends on the lower side of the horizontal tube. The reflecting surfaces of the mirrors face each other at a minimum distance of 130 mm. At this distance the image will not fall on the edge of the microscope stage. The larger mirror

width can be as short as 65 mm., as the width of the projected image on the 45° sloping surface is not as great as the vertical dimension.

A thin, metal collar is bolted or soldered at right angles to the horizontal mirror housing in order to clamp it around the ocular and draw tube of the microscope. A rubber ring placed above the ocular keeps it from being scratched. Lining the metal collar with felt or three layers of tape will protect the draw tube.

A concentrated light source, such as that produced by standard condenser type microscope lamps, will produce adequate illumination for 10× and 20× objectives. A carbon arc or other intense light source should be used for greater magnifications. The room must be darkened and shields are used to prevent light from reaching the drawing paper. Matte black paint or paper can be used inside the mirror housing to eliminate stray light reflections.

## Knowledges of Botany Possessed by High School and College Students\*

GEORGE GREISEN MALLINSON, Western Michigan College of Education, Kalamazoo, Michigan

This study was not undertaken originally for determining achievements of any group or groups of students in the field of botany. Rather, the conclusions herein were drawn from data obtained for a number of other studies.

During the last three years the author has engaged in a number of research projects involving the use of tests in the different areas of science. The tests have contained, of course, many questions other than those dealing with botany. The tests and the research projects in which they were used were these:

1. Over 4000 Regents Examinations in Biology of the University of the State of New York completed by high school students during 1949 and 1950. They were used in a major investigation concerning certain characteristics of the Regents Examinations.

2. Over 1000 Minnesota State Board Examinations in Biology for 1947 that were administered to students in five midwestern colleges and universities.

3. Over 180 comprehensive examinations in science taken by student teachers in six midwestern teachers' colleges and colleges of education, whose major field was science.

4. Over 80 comprehensive examinations in science and mathematics used by Western Michigan College of Education to award science and mathematics scholarships to superior

students from high schools in the State of Michigan.

5. Over 100 classroom tests of subject-matter in biology given to students who were enrolled in the author's methods courses.

The questions found on these tests that dealt with botany were listed on a sheet of paper together with the passing percentages made by the students. Scores obtained on questions that dealt with the same topic were compared with one another, the types of errors made by the students were noted, and the types of questions that seemed to cause the greatest difficulty were listed. Also, whenever questions were found for which the passing percentage was the same for students in the upper and in the lower half of the score range, they were listed for further attention.

The data thus obtained were analyzed carefully. Two facts were noted immediately:

1. The *types* of errors found on the papers of college students and on the papers of the high-school students were much the same.

2. The major errors that appeared most frequently could be grouped under three major headings, (1) errors involving "psychological ownership," (2) those involving "absolutism and relativism" and (3) those involving "selectivity." Each of these categories of errors will be treated separately below:

1. **Errors Involving Psychological Ownership.** The term "psychological ownership" refers to the extent to which a student has an adequate perception of a topic of subject matter, the extent to which he can recognize the implications of that topic when they ap-

\* A summary of a report entitled, "An Analysis of the Achievements in Botany of Students at the Secondary and College Levels," and presented to the Botany Section, 57th Annual Meeting of the Michigan Academy of Science, Arts and Letters, at Wayne University, Detroit, Michigan, April 14, 1953.

pear in unique contexts, and the extent to which he can apply and make use of the knowledge when needed.

Unfortunately, the evidence reveals that both high-school and college students have a verbal knowledge of subject matter far greater than psychological ownership. A few illustrations will make this clear.

On one examination a group of college students was given the task of drawing and labelling the cross-section of a woody stem. The average score received for the drawings was about 90%. The drawings they produced consisted of a series of neat concentric circles demarking the xylem, cambium, phloem and cork. On another section of the examination was an illustration of a quarter section of a woody stem as it would ordinarily appear. The students were asked to label the parts. The average score was about 45%. Obviously, the students had learned the woody stem in terms of a series of verbal symbols, but had not established an adequate perceptual pattern of the woody stem in their minds.

On an informal test students were asked three questions. The first was to define and describe the sporophyte and gametophyte generations of the "common moss." The second was to list the characteristics of roots, stems and leaves. The third was to define and give examples of the term "photosynthesis." Nearly all the students who had taken courses in botany were able to muster a satisfactory answer to the first question. Yet less than 50% were able to differentiate between the sporophyte and gametophyte generations when handed samples of the moss.

The task of defining "root," "stem" and "leaf" proved to be no problem. Yet less than half were able to classify correctly the "stalks" of a bunch of celery.

Nearly all the students defining photosynthesis stated correctly that "the green plant manufactures its food from  $\text{CO}_2$  and  $\text{H}_2\text{O}$  in the presence. . . ." Yet when asked to name the food of green plants about eighty per cent stated  $\text{CO}_2$  and  $\text{H}_2\text{O}$ .

In another interesting experiment, a methods class in biology developed a list of the basic characteristics of plant, animal and mineral substances. When the list was accepted as being satisfactory, the students were shown the black, dry embryo cases of the dogfish (skate). They were asked to decide, according to the list that they had prepared, whether the object was animal, vegetable or

mineral in origin. Only 10% suggested that it was animal in origin, and these suggested that it was the exoskeleton of an insect! More interesting, however, was the way the students altered their observations so that they would fit the characteristics in the list.

While all students did not so err, the vast majority did. The question is whether they read about botany, or know botany.

**II. Errors Involving Absolutism and Relativism.** It was quite surprising to note the number of students whose minds accepted botany in terms of "pigeon-holes" or "honeycombs." Few students seemed to accept the fact that characteristics in the botanical world fall on a continuum.

One could infer from the answers in the area of classification that the Deity had manufactured a box with a neat number of little compartments. Over the top of each was placed a neat typewritten card which listed the characteristics the inhabitant of the compartment was to receive. The characteristics of all compartment dwellers were mutually exclusive. An organism was then fashioned completely independently from all other organisms. It was then deposited in the compartment to reproduce its kind.

Few seemed to comprehend the significance of the evolution of characteristics in biological history. The answers to many questions seemed to indicate that students construed evolution as the emergence of a rabbit from an apparently empty hat. The need for learning botanical differences in terms of relativism rather than absolutism is clear.

Another question stated that seeds of a certain flower were planted in a container of soil. The ratio of the color characteristics that appeared was 193 to 61. The students were asked to identify the probable genotype of the parents. About 38% correctly indicated that both parents were probably hybrids. Most of the others protested that the offspring of hybrids have the characteristics in a ratio of 3 to 1. Since this ratio was not exactly 3 to 1, it was impossible to state what the parents were!

The need for developing the idea of relative rather than absolute appearance of characteristics, and the chance assortment, is clearly evident.

**III. Errors of Selectivity.** The inability of students to differentiate between pertinent and impertinent factors, to select from many

pieces of evidence those that are significant, and to discern the elements in an experimental situation is quite marked.

In one problem the college students were given the following materials: a geranium plant, 2½ inch disks of cork, 1 pin, alcohol, iodine solution and phenol. They were asked to describe an experiment, from purpose to conclusion, that could be performed with the materials. Only one of 93 students failed to suggest that the experiment involved photosynthesis. Yet 72 found some way for using the phenol, obviously an inappropriate one.

On another test given to over 1000 college students, the answers suggested by 420 of these students who had taken botany to a question involving transpiration were analyzed. Less than half of the students were able to distinguish between the control and the experimental factors. Further, the experiment was to be carried out in a series of steps with the information obtained in one step to be used in the next. Less than one-third of the students were able to select from the one step those elements necessary to carry out the next step successfully.

It seems apparent that the meaning of experimentation to botany students is very nebulous and not well understood. The fundamental experimental skill of being able to examine evidence, and to select that which is pertinent, seems to be woefully weak. Interestingly enough, the students receiving the higher grades on these examinations did not do commensurately better on the thought and relationship types of problems than did those who received the lower grades. The increment by which the better botany students exceed the poorer ones seem to be gained on factual type questions.

Of course, it is easy to state weaknesses in a smug fashion without recommendations. Yet it does seem to be a responsibility to make some suggestions for the alleviation of these weaknesses. Hence a few are here made:

1. Teachers of biology at both the high school and college levels need to ask themselves the question, "Is the purpose of our teaching to enable the students to assemble a mass of botanical facts to be disgorged at test time, or is it to enable them to search for and recognize botanical truths, to recognize botanical relationships, and to make use of

botanical facts?" The first purpose has the implications of the story of the woman who baked pancakes merely for the purpose of storing them in the cellar in trunks. The second objective is, of course, the one which biology teachers accept, or to which they give lip service, and which research evidence has shown to be eminently justified.

2. No purpose can be attained maximally by any means other than direct teaching. Hence, the abilities and skills implicit in the second purpose are not natural concomitants of the dissemination of facts. The student will not learn to think critically in a laboratory unless the design of the experiments forces him to do so. Too often we have assumed that if a student performs the same experiments as did those great botanists who did think critically and who did discern relationships, then he will do likewise. Unfortunately, there is no evidence to support such an assumption and a good deal of evidence to negate it.

Thus the passive *hope* that students will learn to discern, to relate, and to select must be translated into an active *demand*. We must be less willing to accept neat drawings and be more desirous of building in the student the ability to interpret his findings by means of laboratory exercises that require such interpretations.

3. The implications herein mean one thing especially. There may be a need for reducing the quantity poured out to the student with an increase in quality. Any good farmer knows that the Holstein gives volume, while the Jersey gives fat. There is a biological principle here that cannot be ignored. Perhaps we are being driven to making our choice. The results of this study, however, indicate that too much of our botanical teaching is a veneer rather than solid wood. We had better make the choice of our objectives and then implement that choice.

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His many NABT friends may want to extend get-well wishes to genial Pres. Blair Coursen of General Biol. Supply House, who met with a serious accident while on a trip West and has been recovering at Teton Memorial Hospital, Chateau, Montana. Best wishes from the ABT staff, Dr. Coursen!

**A rubber band** will substitute for a broken steel spring drive belt on aerator pumps and such until a new belt can be obtained.

## Inspiration Via The Disc

**ROBERT WHEELER**, Biology Teacher and Director of A-V Aids, Junior-Senior H. S., Waukesha, Wisconsin

I'm a high school biology teacher. I think it is part of my function to inspire students as well as to acquaint them with the antics of amebas, corpuscles, and lazy genes. To my way of thinking, one way to inspire youngsters is to help them discover what the "greats" have done in biology and related fields.

Some time ago I referred a class studying bacteria and other microorganisms to biographies containing the stories of people like Hooke, Schleiden, Schwann, and Leeuwenhoek. Among the books recommended was one telling the story of Leeuwenhoek's pioneer work with the microscope. Several students became interested in the story and the man to the extent that I felt persuaded to give their interest a little extra shove. I said, "Why don't you rewrite the story, converting it into a play?" Then, one of those spur-of-the-moment ideas dropped in and I added, "If you do it well, we'll have it recorded."

Never again will I harbor any doubts about the effectiveness of a promise to preserve contemporary talent for posterity; they fell to with a will! In short order they came up with a five-page script complete with parts for a cast of five, stage directions, a narrator—even sound effects. There followed a series of experiences that were gratifying to me and almost certainly must have made the work of Anton van Leeuwenhoek much more meaningful to the youngsters involved in the proj-

ect. There was casting to do, then script-trimming, and revision. There was the tinkling of glassware and the noises of lens-grinding to be worked in for sound effects, and finally the wave of the hand saying, "You're recording!"

We cut the little play onto a 12 in. disc using our school's disc recorder cutting at 33 $\frac{1}{2}$  RPM. Of course each participant, wishing to make sure that his particular segment of "posterity" would not be neglected, wanted a copy of his own. This called for duplicating in the only inexpensive way available to us—playing the original into the mike of the recorder to cut six additional discs.

About then, the Science Department got its annual request for a program to be broadcast from the local radio station—part of "Your Schools in Review," a weekly broadcast mirroring local school affairs. Our "Life of Leeuwenhoek" won a quick decision. After all, it was all prepared! But now a weighty choice: shall we send the recording down to the radio studio, or shall we send the "live" cast? Again a quick decision, with the lure of the studio winning handily over the portability of the disc. Every youngster in the group (although affecting a blase "I-do-this-every-day" front) thrilled with the experience that started with a class assignment. Spurred by the experiment with the disc recording, the play reached its climax with the pointed index finger that said, "You're on the air!"

## Enzymatic Aid for Euglena

**HOWARD BAKER**, El Dorado High School, El Dorado, Kansas

How I happened to start working with euglena and the account of six years of experimentation would occupy too much space. It is enough to describe a simple method whereby, with the aid of enzymes, one can grow a good culture in a few days for class examination and still keep that same culture for a long time on a minimum amount of attention. I have kept my present stock for over six years. Some of my cultures survived for more than a year on one feeding without suffering notice-

ably. It seems wiser, however, to start new cultures whenever rapid growth is desired. Evidence indicates that the action on starch is invaluable to euglena as well as to many other small organisms in their metabolic processes. A little artificial digestion is a great accommodation. Or perhaps the protein in the enzyme is sufficient.

The simplest and one of the best methods of feeding that I found, was to add one-fourth teaspoon of commercial diastase malt to 400

cc. or nearly a pint of water. That is all there is to it. Just add the euglena and wait a few days. Of course the more organisms you add the sooner you will have a dense population. This method produces a most beautiful green color throughout the liquid. An even denser growth may be produced by adding the equivalent of five or six flakes of cooked oats, seasoned to taste, from your breakfast cooking. If you care to prolong the available food supply, add about six grains of uncooked rice when the culture is a week or two old.

It is not necessary to cook or to salt the oats, or to add the diastase. Good cultures can be produced on starchy foods alone or on diastase alone. The diastase has definite advantages and is much better than other enzymes used.

The following hints may benefit those who are unfamiliar with handling such cultures.

1. When tap water is used, it should be allowed to stand in an open glass vessel for several days before using in order to permit harmful gases to escape.
2. Add several pipettes of euglena immediately after adding the food; otherwise undesirable bacterial and mold growths will take over. With this sort of control it is possible to demonstrate that the euglena can hold down such growths.
3. Stock cultures are easily kept in pint fruit jars. Lids hold down excessive evaporation but several nail holes should be made in the lids. Separate cultures for student use are more convenient in culture dishes.
4. Best results probably will be obtained from cultures receiving light from north windows, or from cultures placed several feet from other windows.
5. To find cell division, draw the specimens from the very bottom of a new and rapidly growing culture. Even then you will not always find cell division.
6. It is not difficult to keep a pure culture of euglena, however several other species of organisms, including rotifers, may thrive in the same culture. Rotifers do well on "euglena pastures."

### YOUR ATTENTION, PLEASE!

The Audio-Visual Aids Committee is anxious to be of the greatest possible service to the mem-

bers of NABT. We shall continue to review new A-V materials as they become available, to conduct previews of these materials at national meetings, to note new A-V equipment, and prepare A-V lists for various biology topics at different educational levels, in a continuing evaluative procedure. We would like to serve as a liaison agency between producers of A-V aids and teachers, and plan to report on televising in the field of biology.

To make this program effective, the Committee needs to know how each of you could benefit most from our activities. It asks your advice concerning needs for A-V materials or equipment not now available, and your opinions about new materials and developments. Will you take a few minutes to write a card or letter giving your reactions? Mention also if you would like to assist the Committee in fulfilling its program. Address correspondence to: The Audio-Visual Committee, Emery L. Will, Chairman, State Univ. Teachers College, Oneonta, N. Y.

### FROM THE RETIRING EDITOR

When in the fall of 1941 I agreed to undertake the job of Editor-in-chief of *The American Biology Teacher*, I had no idea that it would turn out to be an 11-year job, or I might have been scared away. I have enjoyed every bit of it, even though the start was not encouraging. The previous editor was unable to attend the Dallas meeting, where the official transfer of files took place, so all doubts and questions had to be resolved by mail after the meeting.

The first big job was that of bringing out a National Defense Issue; M. C. Lichtenwalter, now better known as "The Old Fossil" who writes *Biology Laboratories*, volunteered to do what he could in the production of this special issue, so I appointed him Guest Editor. He assembled papers for the April, 1942 issue, while I practiced on the February and March issues.

Although I was a charter member of NABT it was a complete mystery to me how I was chosen as Editor. I was not an Associate Editor at the time; in fact I was not on the staff at all. An article I wrote for the February, 1940 issue had created quite a stir (I have just reread it and cannot see why), and led to my serving on some committees. Anyway, the first thing I knew I was the Editor-in-chief.

It has been a wonderful experience. It has brought me hundreds of personal acquaintances among biology teachers all over the United States. I know on a first-name basis



every one who has served NABT as President, and this is true of most of the other officers. I worked with every Secretary-Treasurer the association has had, and with all the Managing Editors except J. S. Mitchell and Al Fried, who served in the first two years of the Association, 1938-9 and 1939-40. When I took over the Journal, Homer Stephens was President (there had been only three presidents before him—M. C. Lichtenwalter, Malcolm Campbell, and George Jeffers), and P. K. Houdek was Secretary-Treasurer (he was the first to hold that office). "Brad" Price was the Managing Editor; he was the third, having been preceded by Mitchell and Fried.

I have made up 92 of the 120 monthly issues of ABT that have been published. I was the third Editor-in-chief, the two previous ones being A. I. Herskowitz, who edited the issues from October, 1938 to January 1940, followed by E. C. Colin, who turned the journal over to me with the February, 1942 issue. My first issue was February, 1942—Volume 4, Number 5. 92 issues make up several pretty good sized books. Many people have helped regularly and faithfully in the

production of these. To name them all would require several pages, but it may be noted that more than half of the members of the present Editorial Staff were on the staff in 1942.

The four principals of such a magazine as ours are the President and the Secretary-Treasurer of NABT, the Managing Editor, and the Editor-in-chief of the Journal. The historically minded members of NABT will be interested in the accompanying table showing who carried these responsibilities. The addresses given are those at the time of selection for the office.

It is the continuous and efficient service of many individuals that make such a journal as ours possible. With all the personnel on a voluntary basis, no one person can take enough time to do a good job. One major aid has been the cooperation of the Kansas State Teachers College of Emporia, which deserves thanks for office space, for the use of office facilities, for assistance in mimeographing and mailing, for an unknown amount of my time, and for many other items. And of course, the advertisers are of the utmost importance; not only is their financial support essential, but their products are essential to the readers of the magazine.

Throughout the eleven years, ABT policies have not changed in major matters, although there have been many changes in procedure and specific methods. We have throughout tried to meet needs of teachers as we were able to determine those needs. We have tried to steer a middle course between being too strict and being too lax in the selection of manuscripts. We have tried to maintain a balance between articles written by college authors and by high school teachers and pupils; also a balance between "practical" and "theoretical and philosophical" articles. We have tried to maintain some sort of geographic distribution in the sources of the articles. We have refrained from publishing anything that was, or seemed to be, in the nature of a personal attack.

Some queer things happen in the life of a journal. When an Editor receives in the same mail a letter that says "ABT is all right for the West, but we in the East don't get much out of it," and another that says "Why do you publish only articles that are suited to the way they teach biology in the East?" he wonders what he has been publishing; then, when he writes to both persons and asks what

they would like to see in the Journal, and he gets almost identical answers from them, he can only conclude that they copied their answers out of the same education textbook! And speaking of copying, how does an Editor handle a manuscript almost word for word a chapter from Harrington Wells' book on *Elementary Science*? What does he do about one that he knows is being submitted simultaneously to about a dozen journals? On one occasion, within a few days of each other, I received a vigorous letter saying "Why in heavens name do you publish junk like \_\_\_\_\_'s article?" and a request from a state conservation agency for 3000 reprints of the same article. Another time, when I received from a reader a strong protest against a certain article, I replied that this particular article had drawn more favorable comments

than any other published recently, his answer was: "Those comments were not typical; mine are." From the Editor's viewpoint, the only logical comment is: "It takes all kinds of people to make a world."

There are certain chronic difficulties that have remained more or less constant throughout the years. One is the difficulty in obtaining good "practical" articles, and the ease with which one accumulates "theoretical and philosophical" ones. Another is to keep up the supply of good articles written by high school teachers. Another is to get good illustrations for the articles that need illustrations, if they are to measure up their possibilities.

I cannot refrain from saying once more, "A magazine belongs to its readers." Regardless of the Editorial Staff, the readers can make a

#### PRESIDENTS AND SECRETARIES OF NABT, AND EDITORS OF THE AMERICAN BIOLOGY TEACHER, 1938 TO 1953

	President	Secretary-Treasurer	Editor-in-Chief	Managing Editor
1938-39	M. C. Lichtenwaller Chicago, Ill.	P. K. Houdek Robinson, Ill.	I. A. Herskowitz New York City	J. S. Mitchell Lexington, Ky.
1939-40	Malcolm Campbell	P. K. Houdek	I. A. Herskowitz, and E. C. Colin Chicago, Ill.	A. A. Fried New York City
1940-41	George W. Jeffers Farmville, Va.	P. K. Houdek	E. C. Colin	A. A. Fried, and Charles B. Price Chicago, Ill.
1941-42	Homer A. Stephens Atchison, Kan.	P. K. Houdek	E. C. Colin and John Breukelman Emporia, Kan.	Charles B. Price
1942-43	Merl A. Russell Highland Pk., Mich.	P. K. Houdek	John Breukelman	Charles B. Price
1943-44	Merl A. Russell <sup>1</sup>	George W. Jeffers	John Breukelman	Charles B. Price
1944-45	Helen Trowbridge Glen Ellyn, Ill.	Merl A. Russell	John Breukelman	Charles B. Price
1945-46	Prevo L. Whitaker <sup>2</sup> Bloomington, Ind.	Merl A. Russell	John Breukelman	O. D. Roberts Oak Park, Ill.
1947	E. Laurence Palmer Ithaca, N. Y.	Merl A. Russell	John Breukelman	O. D. Roberts
1948	Howard Michard Lafayette, Ind.	John P. Harrold Midland, Mich.	John Breukelman	O. D. Roberts and Irving C. Keene Brookline, Mass.
1949	Ruth A. Dodge Johnstown, N. Y.	John P. Harrold	John Breukelman	Irving C. Keene
1950	Betty Lockwood New York City	John P. Harrold	John Breukelman	Irving C. Keene
1951	Richard L. Weaver Chapel Hill, N. C.	John P. Harrold	John Breukelman	Betty Lockwood and Muriel Beuschlein Chicago, Ill.
1952	Harvey E. Stork Northfield, Minn.	John P. Harrold	John Breukelman	Muriel Beuschlein
1953	Leo F. Hadsall Fresno, Cal.	John P. Harrold	John Breukelman and B. B. Vance Dayton, Ohio	Muriel Beuschlein

<sup>1</sup> No annual meeting, due to war; all officers held over, except Secretary-Treasurer; upon resignation of P. K. Houdek, Executive Board appointed George W. Jeffers.

<sup>2</sup> Prevo Whitaker served from October 1945 to December 1946, when the fiscal year was changed from the school year to the calendar year; since then officers have assumed duties on Jan. 1.

magazine what they want it to be. If not enough of them are interested in it, or if not enough of them express their interests, the Editorial Staff does the best guessing job of which it is capable and sets up the magazine according to that guess.

And, finally, I wish to thank all of you personally—whether you are officer of NBT, contributor of articles, member of the Editorial Staff or a committee member, Guest Editor, advertiser, reader of ABT, or anyone else who helped, and in whatever way you may have made your contribution—who have helped to give *The American Biology Teacher* whatever success it has had in the past 11 years and to make my term of service pleasant. And I wish to bespeak for Mr. Vance the same fine cooperation from all of you which for these 11 years you have been giving to me.

## The Nominating Committee Reports

### For President-Elect

1. **Brother H. Charles**, F.S.C. (Charles F. Severin). Prof. of Biology, St. Mary's College, Winona, Minn. B.S., M.S., Ph.D. Univ. of Chicago; 16 yrs. high school and 20 yrs. college teaching; author of high school biology textbook, a workbook, and a handbook for biology teachers; founder of Chicago Catholic Science Teachers Ass'n; member of numerous educational and scientific societies; charter member of NABT; author of many articles in *The American Biology Teacher* and other journals; contributor of column "Biology In The News"; Assistant Editor since 1940.

2. **Malvina Trussell**, Florida State Univ., Tallahassee, Fla. B.S., M.S., Ph.D. Cornell Univ.; has taught from 1st grade through university level; 23 yrs. at Georgia State Teachers College as Head of Biology Dept.; Science Consultant in Florida, Georgia, and at Univ. of Minnesota; author of content material for various sciences, and methods and techniques for presentation, published in *Georgia Educational Journal* and others; Editor of *News Letter*, American Nature Study Society; Florida State Chairman, NABT Conservation Project.

### For First Vice-President

1. **John Breukelman**, Head of Biology Dept., State Teachers College, Emporia, Kansas. A.B., M.S., and Ph.D. Univ. of Iowa; 4 yrs. high school and 23 yrs. college teaching; author of a manual for college general biology; a popular booklet on Kansas fishes, and about 30 scientific and educational articles; Past Pres. Kansas Academy of Science; member of 12 professional societies; charter member NABT; Editor-in-Chief of *The American Biology Teacher*, 1942-1953.

2. **Howard E. ("Howdy") Weaver**, Assoc. Forestry Educator, Texas Forest Service. B.S., Ph.D. Cornell Univ.; Regional Chairman, NABT Region 7; native Hoosier, with "a foot on the curb and a foot in the furrow," transplanted to Texas; 3 yrs. army service; publications include 633-page "State Park Naturalist Programs—Their History, Present Status, and Recommendations for the Future," 260-page "Manual of Forestry," revision of popular 130-page bulletin "Forest Trees of Texas and How to Know Them," "Trees as Poets See Them," and numerous articles for scientific, educational, and industrial periodicals; affiliated with many professional education, scientific, and service organizations; hobbies include natural history and nature photography; Member Phi Kappa Phi, Phi Delta Kappa, Xi Sigma Pi, Gamma, and Alpha Phi Omega.

### For Second Vice-President

1. **Rex Conyers**, Biol. Instructor, Senior H.S., University City, Missouri. B.S., M.Ed. (Conservation Education), Univ. of Missouri; 16 yrs. high school teaching; developed one of first large-scale H.S. conservation demonstration areas; pioneered project method of teaching conservation and biology; students consistently hold top-rank at 1800 Project Greater St. Louis Science Fair; member numerous educational and scientific organizations; Pres. Missouri Science Teachers Ass'n, 1949; charter member NABT, State Membership Chairman, 1950-1953; member Conservation Project Committee; Consultant, summer camp work; Instructor of Adult Evening Class in Nature Recreation; author "Flight Schedule of Birds, Jackson County, Missouri"; co-author "Guide to Birding Areas of St. Louis Region"; Editor, St. Louis Audubon Society *Bulletin*; local representative for NABT Nat'l Convention, 1952.

2. **Dorothy Miller Matala**, Iowa State Teachers College, Cedar Falls, Ia. A.B., M.A., Ph.D. in Nature Educ. at Cornell Univ.; high school teacher of biol.; 3 yrs. junior college; Critic Teacher at Univ. H.S., Bloomington, Ind.; now teaching life sciences for elementary teachers; on Staff of Iowa Teachers Conserv. Camp since beginning; Park Naturalist, Ind. State Parks, 3 yrs.; member Phi Kappa Phi, Sigma Delta, Iowa Acad. of Sc., and Am. Nature Study Society; interests in outdoor education, nature recreation, school camping, birds, etc.; member State Committee on School Camping and Outdoor Education, NABT State Committee on Conservation; helps prepare and present weekly program on elementary science over WOI-TV.

3. **Stanley Mulaik**, Univ. of Utah. B.S., M.S., in Nature Study at Cornell Univ.; teacher and supervisor, Jr.-Sr. H.S. and Jr. College, 11 yrs.; Vice-Pres. and Pres., Western Div. of Am. Nature Study Society 1951, 1952; member Phi Sigma, Tex. Acad. of Science (Fellow), Utah Acad. of Science, Biol. and Ent. Societies of Washington, Am. Soci-

ety of Ichth. and Herp., Mass. Forestry Ass'n, A.A.A.S., Society of Syst. Zool., Am. Ass'n of Univ. Professors, and Nature Conservancy; publications include over 30 titles, several more in process, and manuscripts nearing completion.

#### For Secretary-Treasurer

1. **John P. Harrold.** (See Oct. 1952 issue of this Journal.)

2. \_\_\_\_\_

#### NEW ASSOCIATE EDITORS

The Staff and Association welcome two outstanding NABT members to fill jointly the position of Associate Editor (formerly termed Ass't Editor). Manuscripts for major ABT articles should be sent to one of these two men, not to the Editor-in-Chief.



**Paul Klinge** has taught biology for ten years at Thomas Carr Howe H.S., Indianapolis, Ind., with additional duties as the school's Manager of Business and Publications. Paul's chief interests are in biological and sociological relationships.

While at Howe, he initiated special classes for potential science majors and received national recognition for this work. He will be on leave with The Ford Foundation for personal enrichment studies of gifted students and potential scientists during 1953-1954. His home address is: 246 Ohmer Ave., Indianapolis 19, Ind. Paul says, "I hope to the best of my ability to assist the Staff and membership in making our Journal a real and stimulating service to biology teachers."

**Robert McCafferty**, teacher of biology in the Wadsworth, Ohio City Schools, is well-known as a charter member, former First Vice-President, Editorial Staff member, and former Na-



tional Membership Chairman. He teaches life sciences at both college and secondary levels, formerly edited the house organ of a large business firm, and has been a frequent contributor to science journals. His recent article, "Heredity for High School," School

Science and Mathematics, May 1952, is outstanding. Bob's home address is: 371 Broad Street, Wadsworth, Ohio.

#### Proposed Changes in the Constitution

##### Present form

##### By-Laws

##### Article I

##### Section 5 (in part)

The books shall be audited by a certified public accountant or by a special committee of three members . . . .

##### Article VII

##### Section 1 (in part)

Any active local, state or regional biology teachers association having a membership of at least 25 and holding regular meetings may affiliate as a chapter of this association by petitioning the Board of Directors for such affiliation . . . .

**Seeds of the asparagus fern** produced in July will germinate. Collect the red seeds (red an indication of maturity) and sow in a seed flat, half soil and half humus. Use deep shade, and plenty of water.

##### Proposed Amendment

##### By-Laws

##### Article I

##### Section 5 (in part)

The books shall be audited by a qualified accountant or by a special committee of three members . . . .

##### Article VII

##### Section 1 (in part)

Any active local, state or regional biology teachers association may affiliate as a chapter of this association by conforming to the following requirements:

1. Make a formal application.
2. Hold regular meetings.
3. Must have a minimum of 25 members of NABT or at least 25% of membership must be members of NABT in order to be represented on the Board of Directors.
4. Must send an annual report of their meetings.

Each affiliate to receive a certificate of affiliation . . . .



## *Across The Editor's Desk*

(Your Editor wants news items about YOU, your regional, local, and affiliate activities, and other NABT people and friends for this column.)

### **Did you know that—**

*Bibliography of Free and Inexpensive Materials*, prepared by our versatile **Muriel Beuschlein of Chicago Teachers College** and printed in the Feb. 1953 issue of ABT for our **Nat'l Conservation Project**, has been reprinted by **International Harvester Co?** Copies are available from **Project Leader Richard Weaver**, P.O. Box 2073, Ann Arbor, Mich., at 10¢ each; 20% disc. on orders of 100 or more. The *Bibliography* covers private, gov't, and industrial sources; materials are useable in Grades 1-12.

An "**Idea Book**" (Re: Bob McCafferty) can be a **valuable professional aid?** Contact Bob for his "Ideas on Ideas," City Schools, Wadsworth, Ohio.

**H. Seymour Fowler**, Iowa State Teachers College, Cedar Falls, Ia., is our new **National Membership Chairman?** Help popular Bus and his **Regional Chairmen** make NABT grow!

**Paul Klinge** and **Robert McCafferty** (details and addresses in this issue) are doing a great job jointly as our **new Associate Editors** (formerly termed Ass't Editors)? **All manuscripts for major ABT articles should be sent directly to one of them, and not to the Editor-in-Chief.** Send them prepared articles on your pet teaching devices and methods, your research activities, informational materials of teaching value to our members, etc., for possible publication; also your suggestions for making ABT increasingly of direct use to you in your classroom and laboratory. If you need hints on how to prepare manuscripts for publication, contact them.

**Sister M. Gabrielle**, energetic and capable leader in elementary science teaching in the Central States, has been chosen as **Ass't Editor in charge of materials on teaching life sciences and nature study in the elementary grades?** **Elementary teachers** contact her with your **ideas and "How I Did It" devices**, and for help in making biology live with your **embryo scientists**.

**Former Editor John Breukelman** is well-along to recovery, and will serve on our Advisory Staff? We're sure proud to have you, John!

**Robert Gering**, Univ. of Utah, Dugway Proving Grounds, Tooele, Utah will serve as Assistant to our most capable and energetic Managing Editor?

Bob has been responsible for recent intriguing membership promotion folders, and for other behind-the-scenes work with such fine success.

**Your Editor** is just beginning to realize what a king-sized job this is, and needs the help and encouragement of ALL OF YOU? He is starting work with **Lenard Winier**, of Iowa State Teachers College, Cedar Falls, Ia., on the Ms for a college textbook in biology for general education and teacher training, and would welcome suggestions from college teachers of such courses.

**Ruth Stein** and **Lee Yothers**, veteran members of the Staff, have asked to be relieved of their duties for the present? Best wishes to you, Ruth and Lee; we know you will continue to vigorously support **NABT and ABT** otherwise as you have in the past.

**S. David Greene** (capable consultant on art and photography), P.O. Box 105, Cheshire, Conn., **Marcellus C. Miller** (representing the Southeast), Battleboro, N. Carolina, and **Bro. G. Nicholas** (noted spelunker—"cave goer-int6" to YOU), La Salle H. S., Cumberland, Md., bring their fine talents and inspiration to the Staff as **new Ass't Editors?** Contact them, as well as the other Ass'ts, with your ideas and needs. A complete listing of the revised Editorial Staff will appear in an early issue.

**Emery Will**, State Teachers College, Oneonta, N. Y., is the **new Chairman of NABT's Audio-Visual Aids Committee?** Contact him for his capable advice on your A-V needs, and for ideas on what ABT can do to serve YOU in this area.

**Exakta Cameras** are used for some of the best photo illustrations appearing in ABT? Write to **Mr. Wolf Wirgin** for your photographic needs, and for free booklets on Nature Photography.

**James Sanders** had an interesting article on "Human Conservation" in the Jan. 1953 issue of *School Science and Mathematics*. Reprints may be available through Dr. Sanders.

"**Carolina Tips**," Carolina Biol. Supply, Elon College, N. C., is free to biology teachers, and contains interesting and practical materials.

**Turtlox News, Turtlox Teachers' Manual**, and **Turtlox Service Leaflets** are musts for busy biologists. Write to Gen. Biol. Supply House, 761-763 E. 69th Place, Chicago 37, Ill.

**Welch Science Digest** will bring abstracts of science teaching articles from many sources. Write to W. M. Welch Mfg. Co., 1515 Sedgwick St., Chicago 10, Ill. Their free booklet, *A Living Biological Laboratory*, will provide many practical hints on the care of plants and animals in your laboratory.

You will be challenged and helped by reading The Ford Foundation's recently-published **Bridg-**

**ing the Gap Between School and College.**

Write for a copy to The Fund for The Advancement of Education, 575 Madison Ave., New York 22, N. Y.

**Denoyer-Geppert's Dr. Frank Kittner** supplied free plates, paper, and printing for 16,000 NABT spring membership campaign folders? Visiting biologists and elementary teachers in the Chicago area should contact Dr. Kittner for a most interesting tour of their plant at 5255 Ravenswood Ave.

**William Gamble, of Ward's Nat. Sc. Establishment, Inc.,** Rochester, N. Y., prepared 25,000 NABT winter campaign membership folders, and has offered cooperation again in the same way? Ward's publish a most interesting *News Letter*. Bill spent his "vacation" in Maine supervising the collecting of dogfish for fall orders.

**Pres. Blair Coursen, of Gen. Biol. Supply House,** 761-763 E. 69th Place, Chicago 37, is a staunch supporter of and contributor to many NABT activities? Do you receive their *Turtlox News*? If not, write for it.

**Harvard Apparatus Co.,** Dover, Mass., can supply almost any type of biological apparatus you may need? A recent letter from Pres. A. J. Carlson of this educational non-profit organization urges that teachers write to him about items not carried on their list, items worthy of improvement or replacement, and ideas and needs for simple apparatus for the training of beginners in science. You elementary teachers of life science and nature study, particularly, should follow-through.

**William Noonan,** extended day program student at Chicago Teachers College, won the prize of a year's subscription to ABT which was offered personally by Managing Editor Beuschlein for the best title for our Classified Ads column. Bill's winning entry was **BIO-BUY-LINES**.

**NABT member Charles Walcott,** 81 Sparks St., Cambridge 36, Mass., would like suggestions from teachers about their needs for reasonable color slides of insects and other life subjects. Charles contributed some fine photos for ABT cover illustrations. **New England Biological Ass'n members,** particularly, should make use of his outstanding photographic skills; he is writing an ABT article on the preparation of color slides for teaching.

**NABT cooperated with AIBS** in their recent annual meetings at Madison, Wisconsin?

**Bro. H. Charles,** St. Mary's College, Winona, Minn., Chairman of our **Committee on Affiliates,** wants live news of activities and people in local life science teaching and research groups for a "With Our Affiliates" column. If your local group is not affiliated with NABT, write him for details, and check constitutional changes regarding affiliates elsewhere in this issue. We need you, and we modestly feel that you need us!

**Among the many letters of congratulations received—**

Dear Mr. Vance:

We have just been informed that you are the new Editor of *The American Biology Teacher*, and would like to take this opportunity to wish you personally the best of luck and success in your new position.

With regard to *The American Biology Teacher*, needless to say we think this is truly a wonderful magazine. We have noted with great pleasure the tremendous strides and progress which have been made, and we are confident that the future will bring even more worthwhile gains to this excellent publication.

Once again, with our very best wishes, we remain

Sincerely yours,

WOLF WIRGIN,  
*Exakta Camera Company*

**President's Message**

During the past year our Journal has taken on illustrated covers and a more attractive format. It has been greeted by favorable responses from members, institutions, and advertisers, who recognize that it has a special function to perform for American education. Unfortunately publication costs, which comprise the part of our Association's expenses, have risen sharply. This has entailed an increase in annual dues to \$3.75, effective Oct. 1, 1953.

Members are urged to take an active part in the work of our Association. Your Editor is always looking for practical articles for publication. Good cover photos are welcomed. Your President will welcome your suggestions and criticisms. At present there is need for volunteers to work on the Health and Audio-Visual Education Committees. If you are interested in stimulating your local science organization, write to Bro. H. Charles, St. Mary's College, Winona, Minn., for details on how it can affiliate with The National Association of Biology Teachers.

LEO F. HADSALL, *President*

**LETTERS**

My dear Mr. Breukelman:

At a recent meeting of the New England Biological Association, the members requested that I write you a letter, stating that they liked the Table of Contents on the outside where it always has been. They suggested that the picture could be inside or, if more people preferred the picture on the outside,

perhaps the Table of Contents could be printed on the outside of the back page. It was brought out that teachers are interested in the contents of the publication, and since they have a limited time for reading, they like to pick it up, and quickly scan the titles of the articles, without wasting time turning pages.

Sincerely yours,

MABEL A. POTTER, *Secretary,*  
*New England Biological Association*

EDITOR'S NOTE: This is the second time the above suggestion about the Table of Contents has come to the editor. The other letter came from an individual. This one represents a large group. In general, the idea of a picture on the front cover has received a fine response. The back cover is a choice advertising spot; this is the reason it was not considered by the Editorial Board. There is a possibility of both a picture and the table of contents on the front page, but the type has to be small, and the general effect is one of crowding. The Editorial Board, in making its decision, thought the Table of Contents would be almost as easy to find if placed near the front and in the same place in all issues. What do you think? Let us hear from more of you, if this is an important point.

Dear Mrs. Beuschlein:

We greatly appreciate receiving the names of those interested in receiving our literature. This service has never been offered by any other publication and, I must repeat, we do appreciate it and will be pleased to place our advertising with you in the future.

Sincerely yours,

JAMES MCINNIS, *Manager, Supply Dept.,*  
*Marine Biological Laboratory,*  
*Woods Hole, Mass.*

Dear Sir:

For some time I have been wanting to tell you how pleased I am with the articles in this year's *The American Biology Teacher*. . . . The articles that were of special note were: Biology Majors and Industrial Biology, Gering and Kliever, and What to Look for in a Science Teacher, B. H. Carleton, both in the November issue; The Use of Drawings in General Zoology, Greb, in the January issue; The General Education Type of Biology Course, Miller, in the February issue, and A Comparative Study of Objectives, Content, and Methodology of Introductory Courses in Zoology, Lutz, in March.

As a teacher of General Biology for college freshmen, I found all of these articles timely, helpful, and stimulating, and wish to thank you for bringing such help to us.

Very sincerely yours,

SISTER MARY AQUINA, C.S.C.,  
*Dunbarton College of Holy Cross,*  
*Washington, D. C.*

Dear Dr. Breukelman:

I am enclosing a list of laboratory demonstrations in Biology for junior and senior high school students. These demonstrations are being arranged by the staff and major students in Biology of Elmira College for a meeting of the New York State Science Teachers Association—Southern Zone—to be held at Elmira College, October 2, 1953.

There will be a student hostess for every one or two demonstrations. It will be her responsibility to keep the demonstrations in order and to answer questions. By each demonstration that represents a procedure there will be mimeographed detailed instructions for guests to take away.

The titles of the demonstrations might be of interest to the readers of *The American Biology Teacher*.

Yours sincerely,

LYDIA BOURNE WALSH,  
*Chairman, Division of Natural Sciences,*  
*Elmira College, Elmira, New York*

### LABORATORY DEMONSTRATIONS IN BIOLOGY

(arranged for New York State Science  
Teachers Association—Southern  
Zone—at Elmira College,  
October 2, 1953)

#### Field Trips

1. Collection of fossils
2. Recording of birds seen
3. Habitat study (a diorama)
4. Salamanders for vivarium
5. Records of bird songs
6. Collection of bird nests
7. Insect demonstration

#### Aquaria

1. Balanced fresh water aquarium with guppies
2. Marine aquarium

#### Genetics

1. *Drosophila*, parent generation;  $F_1$  generation;  $F_2$  generation
2. Sorghum,  $F_2$  generation of green x albino

#### Permanent Microscopic Mounts Made Without a Microtome

1. Blood smears
2. Free-hand sections of elderberry pith
3. Mounts of onion epidermis
4. Mounts of algae and fungi
5. Maceration of wood
6. Free-hand sections of herbaceous stems

#### Embryology

1. Stages in development of chick
2. Whole mount of chick

#### Physiology

1. Spirometer for vital capacity
2. Streaming of cytoplasm in *Elodea*
3. Microscopic mount of India ink and water to demonstrate Brownian movement
4. Gas formation by yeasts growing in sugar solution in a fermentation tube
5. Muscle sounds heard with stethoscope
6. Circulation in foot of live frog

7. Tests for starch, fat, glucose, protein on beans, corn, potato and onion
8. Digestion of starch
9. Absorption of water by root
10. Osmosis when membrane is a closed one (egg)
11. Effect of cuticle (apple) and bark (potato) upon rate of transpiration

**Soil**

1. Air in soil
2. Water-holding capacity of soil
3. Root systems penetrating soil

**Fruits**

1. Types of fruits
2. Fruit dispersal

**Health**

1. Effect of sterilization, pasteurization, and storage temperature upon milk
2. Petri dishes of nutrient agar exposed to everyday objects
3. Removal of a colored bacterium from hands by washing hands different way

**Clay Modeling** of mitosis, meiosis, earthworm**Garden Design** of colored renderings and planting plans of garden designs (entrance to a property, foundation planting of a house outdoor living room)

Gentlemen:

The writer has had a long experience with over one half century with magazines devoted to human betterment. . . . He is profoundly convinced that the value of at least one cover illustration such as in your March number adds to the attractiveness thereof. . . . "One picture is worth a thousand words."

May I contribute to NABT the widow's mite toward the future expense of such front page illustrations.

Very earnestly,

C. M. GOETHE,  
Sacramento, California

EDITOR'S NOTE: Attached to this letter was a check for considerably more than the cost of a cover picture. Thank you, Dr. Goethe!

Dear Sir:

Will you risk publication of some comments that to some may seem political? Writing in May for your October issue, I none-the-less feel sure the following matter will still be of interest to biologists: let us hope so, anyway!

The so-called "Tidelands Oil" controversy has been settled. But for some of us this matter will never have been settled until the nation as a whole receives benefit from its offshore petroleum property. While the "extended debate for educational purposes" was going on, in March and April, I wrote to several conservationists, whom I expected to be as alarmed as I was, urging them to protest. These people seemed not to be interested. In effect they said, "This is a political matter, and somewhat confusing to boot. What has it to do with us?"

I would suggest not the obvious reply that conservation is broad enough to reach beyond fish and game to forests, grazing lands, mountain scenery and even (dare I add?) human resources; but rather I would point to the fact that the same interests whose political activities have snatched untold wealth in petroleum from the public domain may not be expected to keep hands off other national resources. For surely we know enough of the persistent and powerful lobbies for private control of public power, private exploitation of public grazing lands, and private removal of public forests, not to suppose that the Tidelands Bill has greatly encouraged these interests. Should conservationists be content with consuming whatever fragment of the public domain is left to us after individual avarice has been appeased? . . .

Perhaps we cannot retrieve what our Congress has so generously given away for us. But at least our protest, if made often and strongly, may arrest a trend; a trend toward similar disposal of other public property—parks and forests, even fisheries and game.

Sincerely yours,

ARTHUR W. JONES,  
Assoc. Prof. of Zoology,  
Univ. of Tennessee, Knoxville

**AUDIO-VISUAL NEWS**

. . . The popular 78 rpm record albums of bird songs produced through the facilities of Cornell University (AMERICAN BIRD SONGS, Vol. 1 & Vol. 2) soon should be available in 33-1/3 and 45 rpm speeds.

. . . Many enthusiastic listeners who heard the intermission program of bird songs during the Nov. 30, 1952 broadcast of the New York Philharmonic Symphony Orchestra now own the delightful 10 inch, 33-1/3 rpm record, MUSIC AND BIRD SONGS. Also produced at Cornell, this recording emphasizes the high musical qualities of bird and frog sounds. It may be purchased from Comstock Publishing Associates, 124 Roberts Place, Ithaca, N. Y.

. . . The manufacture of antibiotics provides the subject for a new 25-minute black & white film, " . . . AND THE EARTH SHALL GIVE BACK LIFE." Photographed by Louis de Rochemont and containing views taken through an electron microscope, the film may be obtained for group showings from E. R. Squibb & Sons, 745 Fifth Avenue, New York 22, N. Y.

. . . Magnetic sound movie makers will be interested in a new publication, PIONEER TRACKS, which is designed to serve as an exchange medium for ideas and experiences in magnetic sound recording. If you would like to receive subsequent issues, send your request to Bell & Howell Company, 7100 McCormick Road, Chicago 45, Ill.

## Books For Busy Biologists

JEAN, FRANK C., HARRAH, EZRA C., HERMAN, FRED L., and POWERS, SAMUEL R. *Man and His Biological World*, Rev. Ed. Ginn and Co., New York. viii + 631 pp. illus. 1952.

According to the authors, this revision modernizes content, corrects inadequacies, and gives expression to evolving ideas. Plant phyla are not mentioned as such. There is little mention of animals of the prevertebrate phyla. Vertebrates, other than man, are discussed in only a general way. Excepting bacteria, few members of the lower three plant phyla are mentioned. Reproduction among higher plants is discussed briefly but, in the case of man, detailed treatment is given. The book is well-illustrated, has an 8-page glossary, and a 9-page index. No suggestions for laboratory work, field trips, or visual aids are given, although the latter two procedures are strongly recommended in the Preface. Chapter endings list good study questions and references. The final unit on Cultural Development is interesting and unusual.

M. A. RUSSELL,  
Highland Park Junior College

PRESTON, R. D., D.Sc., F.Inst.P. *The Molecular Architecture of Plant Cell Walls*. John Wiley and Sons, New York. xii + 211 pp. illus. 1952.

This book is written chiefly for botanists. The first few chapters present a résumé of the more important physical and chemical approaches to cellulose structure. For the physical scientists and the fibre technologists an explanatory account is also given of the anatomy and development of the tissues under review.

The literature concerning the structural features of cellulose and the substances associated with it is now enormous and much of the material is available only in the original papers. Up to this time certain aspects of wall structure of greatest appeal to botanists have not appeared in English. A growing need for this material accounts for this book.

PHILIP E. FOSS,  
Hartford Public High School,  
Hartford 5, Connecticut

EISMAN, LOUIS and TANZER, CHARLES. *Biology and Human Progress*. Prentice-Hall, Inc., New York. xi + 455 pp. illus. 1953. \$4.20.

This book, written for average and above high school students, is divided into ten units, each dealing with a central idea (such as *Food*, *Natural Resource Use*, etc.) presented as a group of from three to 11 problems. Each of the 54 problems closes with a summary and group-discussion questions. At the end of each unit is a suggested list of Lab experiences and projects. New scientific terms are printed in bold face and followed by phonetic spelling. The illustrations, mostly photo-

graphs, are unusually clear and well chosen. The glossary is adequate and the index well-organized. The combination of clear writing, excellent illustrations, teaching aids, and flexibility should make this a highly successful text.

WICHTERMAN, RALPH. *The Biology of Paramecium*. The Blakiston Company, Inc., New York. xvi + 527 pp. illus. 1953. \$9.00.

"Gee—a whole book just about a Paramecium!" This comment by my high school age daughter is an apt summary, for this book is all about Paramecia—classification, structure, ecology, collection, metabolism, response, reproduction, genetics, serology, research techniques, and their usefulness in biological research. The style is as simple as the material permits, the 141 illustrations are excellent, the bibliography of about 2000 references covers from 1674 to 1952, and the subject index is unusually well-organized. In view of the wide use of Paramecia in biology at all levels, this book should be in every biologist's library.

GRIMM, WILLIAM CAREY. *The Shrubs of Pennsylvania*. The Stackpole Company, Harrisburg. xviii + 522 p. illus. 1952. \$5.00.

The author has combined scientific accuracy with an appealing simplicity of presentation to produce a practical guide to the shrubs native to Pennsylvania and eastern United States. It is geared to the needs of the layman rather than those of the scientist.

Through an introductory discussion and illustrations, the terms used and points to look for in identification are clearly described. Simple keys for summer and winter identification are easy to follow. Each of the 150 species is adequately described as to its distinguishing characteristics, habitat and the range in the state as well as in the United States. Comments from the author's wide experience give an additional interest note to each discussion. Clear, life-size pen drawings by the author aid materially in identification.

Although the size of the book (8" x 11") prevents it from being practical for field identification, it is an excellent source of information from the later elementary grades through college, and for such laymen as amateur botanists, sportsmen and Scouts.

LYDIA ELZEY,  
The Pennsylvania State College,  
State College, Pennsylvania

ROUNSEFELL, GEORGE A. and EVERHART, W. HARRY. *Fishery Science*. John Wiley & Sons, Inc., New York. xii + 444 pp. illus. 1953. \$7.50.

This book starts out with an unusual chapter on "How Do We Produce Knowledge?" which should clear up some hazy thinking about research. The other sections, Natural Populations, Fish Ponds, Fishing Gear, Protection, Habitats, Tagging, Age and Growth, Collecting Data, Managing Natural

Populations, and Problems, are presented from the practical standpoint, with clear illustrations and many examples of the attack upon and the solution of actual fisheries problems. Each chapter closes with a list of references, both books and periodical literature. The glossary is short but carefully selected for aquatic biology. The index is well organized. Except for a few sections dealing with statistical studies, the level of reading difficulty is well within the ability of the interested high school student. *Fishery Science* should be useful to all biologists, sportsmen, commercial fishermen, limnologists, fish managers, and teachers of field biology.

### Biology Laboratories

By "The Old Fossil," at Wells High School, Chicago

"**The Compound Microscope**," by Bausch and Lomb is a 20 min. sound film in color. A manual for each pupil is furnished. It is a review of types of microscopes and their care. Split-frame technique is used to demonstrate external operation and its effect on the microscope field. Sounds and looks good to TOF.

**Get a laugh from** "The Decadence of the Male," by Causey, in *Educational Focus*, May, 1953. The **Hogarthian Curve** is the culmination of the screwball interpretation (in graphic form of course) of the article. The giggle, snicker, chuckle, or guffaw which you emit indicates your emotional reaction.

**Remember back when** we introduced our subject: "Biology—a combination of the Greek words *bios* (life) and *logos* (the study of)?" It was stiff, formal, classical. Today TOF dictates this introduction: "Biology is the study of life and living things. Since biology is concerned with all life, it must include hundreds of thousands of different kinds of plants and animals. Therefore, biology must first confine itself to general principles. Secondly, it is concerned with the study of *my* life—how I feel, act, and behave."

**Mental Health** should have a specific place in our biology courses. We may again sit on our hands and do nothing. Just remember that we let physiology and health education walk out the window into the Physical Education Camp. Here are some specific road signs pointing the way: **Supt. Norrix**, Kalamazoo, states, "The important thing a teacher can give children is sound emotional development to produce better-rounded individuals. This is as important, or more important, than factual information." **Rudolph Novick, M.D.**,

Director, Illinois Society for Mental Hygiene, avers, "The teacher's first responsibility is to impart factual information. More important, however, is the teacher's responsibility for the personality and character development of the child. The teacher's concern is not with the mentally disturbed child, or mental illness, but with well children. His efforts are directed toward increasing the pupil's ability to adjust to external and internal stress, to enhance his capacities to live a productive, satisfying life, and to aid him in maintaining mental health as the key to effective personal and social living in a democratic society." **A couple or three** of you young bucks and/or dames get your heads together. Come up with a workable unit on mental health. Better still, impregnate the texts you are writing with mental health teachings.

"**School Tours and Special Demonstrations for Classes**," may be obtained from the Museum of Science and Industry, South Shore Drive and 57th Street, Chicago. If you plan a trip to Chicago, write for it. Free.

"**Natural History**" is a classified catalog of several hundred books on the subject. Write **Eric Lundberg**, Walpole, N. H.

**Open House**, confined to the science department of **Wells High School**, was held in late May. Here are some of the attractions taken from publicity copy: See model jet plane; see girl conduct 500,000 volts through her body; hear the electric guitar (student-made project); see electric motors (built by students); hear your voice on tape recorder; see a periscope (made by students); operate an all-electric doll house; get your picture taken; see your voice on oscilloscope; foods refrigeration; nuclear fission demonstration; plant experiments; nutrition demonstration; have your blood pressure taken; see how water is purified; watch cosmetic experiments.

"**HONEY**" was the only sign **Ray Silver** and TOF used to dispose of 2½ tons of honey. It is a blended honey from eight different yards, mixed fruit orchards, alfalfa fields, clover fields, wild woods, and flowers. Fruit orchards honey enhances the bouquet, alfalfa accrues the nectar for body, wild flowers augment the mild pungent aroma, clover intensifies the sustained sweetness. Ray and TOF improve on the bees' nectar by the blending. They will mail order you a two months' supply for \$2.00.

## A Simple Indication of the Efficacy of a Teaching Device

CHARLES E. PACKARD, Randolph-Macon College, Ashland, Virginia

*Food from the Sun*\* is a vivid presentation of photosynthesis, including many ways living things respond to direct and indirect sunlight. It contains much basic physiological and organic chemistry, centered around foodstuffs, the manufacture and uses of sugars in particular. Although geared in appeal to secondary school or lesser levels it holds the attention of older people.

We are so conscious of light and its many influences that it is not unusual to find much general information at hand about the photosynthetic process. If there is anything about plants which students of general science or biology know in part when they arrive at college it is chlorophyll. Plant metabolism has received considerable attention. Chlorophyll-bearing structures are considered important.

At an annual session of NABT which covered teaching implementation an excellent talk was heard on the role of sugars in animal and plant life. *Food from the Sun* was shown, samples of the film strip being distributed. Two of the author's course objectives have been (a) to share with classes benefits gained from trips and meetings; (b) to review vital ideas previous to mid-year examinations. Therefore this series of still pictures was projected before General Biology students on the final day of formal first-semester work.

In the examination of the succeeding Friday, about 48 hours thereafter, 62 questions were asked, evaluated at 1-5 points each. The student selected for a total of 100 credits what he chose to answer. Inserted in the test was the following option: "What 4 facts or points do you recall from the film strip of Wednesday last?" Thirty-eight answered the question. Two mistakenly used a moving picture film on amoeba, shown previously, as the basis for reply.

Several times during the semester metabolism in chlorophyll-bearers was discussed. Some weeks, however, had passed since mention of it. A rather thorough consideration, therefore, was accorded the topic. From the papers only those statements specifically in-

dividual and clearly identifiable with the pictures seen are chosen. The broad idea itself could suggest facts, of course. But the stills are rather striking, full of action and color, well calculated to make lasting impress. Did they do so? Tabulation of the data shows topical summaries with number of times mentioned.

Sunlight, role and importance	21
Photosynthesis: nature of, importance	20
Carbohydrates: types, uses	18
Energy formation	12
Respiration	9
Water need, carbon dioxide use, sugar sources, 8 each	24
Growth in animals, plants	7
Oxygen loss	6
Making carbohydrates, proteins, fats	5
Brownies at work, storage regions, 3 each	6
Absorption, elements needed, sun's distance, speed of light, transpiration, plant organs, food-making, chlorophyll, 2 each	16
Animal health, animal dependency on plants, environment, chemical structure, osmosis, fermentation, tropical plant growth, leaf structure, food cycle, tropical plant size, protein from hen and cow, eggs and milk, plant work at night, 1 each	14
	157

Here are 34 items, reasonably exclusive, mentioned for a total of 157 times by 36 students, nearly the entire group. From this number 65 notations are selected on 20 special headings which could be considered as fairly indicative of retention of important items. The others are such that they could have been included merely from noting that the entire theme was photosynthesis with related phenomena.

A few matters recalled are of note. Two stated the exact time, 8½ minutes, required for light to reach the earth from the sun, a fact appearing beneath the fourth picture, with one recording 93 million miles as the sun's distance away. Three called attention to the "brownies" ("elves") as they busily formed carbohydrates. A lush scene of tropical vegetation was clearly remembered by two, one relating it to moisture, the other to a large aquatic leaf supporting the weight of a good-sized bird.

\* Produced by Sugar Research Foundation, Inc., Box 137, New York 5, New York.

Another recalled the cold-blooded reptiles basking in the warm sun. Quite different was the model illustrating the molecular structure of sugar. A picture showing a hen associated with a nest of eggs, also a cow standing behind a bottle of milk, proved impressive. A boy, baseball bat over shoulder, delightedly eating a candied apple, probably incited the several mentions of quick energy yield with sugar, a fact to which the caption called attention. Some familiar, dynamic situations which would seem to have impressionistic value were definitely overlooked, however, for broader generalizations.

Yet for every representation neglected there were those which were clearly observed and retained. Therefore the great usefulness of this series of illustrations, originally and delightfully conceived and strikingly but scientifically labelled, is well shown for the group involved. The influence of previous lecturing and text-study was doubtless felt yet the figures and pictures must have etched prosaic data on the consciousness with a degree of greater clarity.

## Biology in the News

**He Lives on Ladybugs**, by John Kohler, *Collier's*, Sept. 4, 1953, pp. 82-85.

Certain species of ladybugs are natural enemies of plant lice and other soft-bodied insects. How "Pappy" Quick collects and distributes millions of ladybugs to farmers makes interesting reading.

**Poison in Your Kitchen** by Joan Gould, *Today's Woman*, April, 1953, pp. 36-37 & 162-164.

Substances used in cleaning dishes and other household articles, kerosene, gasoline, paints and spot removers for clothing are responsible for the poisoning of thousands of children every year. This article urges preventive care of such substances and suggests what to do when poisoning happens.

**Could You Be a Secret Tuberculosis Victim?** by Albert Q. Maisel, *Woman's Home Companion*, April 1953, pp. 40-41 & 79-80.

How effective are the TB case finding procedures in your community? The reduced incidence of tuberculosis has led many into a false sense of security. We will never be safe as long as some active cases are at large.

**You Should Know All This about Cancer** by Peter Briggs, *Ladies Home Journal*, April 1953, pp. 52-53 & 127.



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**Who's Winning the Battle of the Bugs?** by Harold H. Martin, *Sat. Ev. Post*, April 18, 1953, pp. 42-43 & 169-170.

Man's fight with the insects goes on. As fast as we devise methods to destroy insects they develop an immunity to them. What we have accomplished and a few of the problems which need immediate solution are well presented.

**Does Habitat Improvement Work?** by Duward L. Allen, *Field and Stream*, Sept. 1953, pp. 50-51 and 95-98.

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